



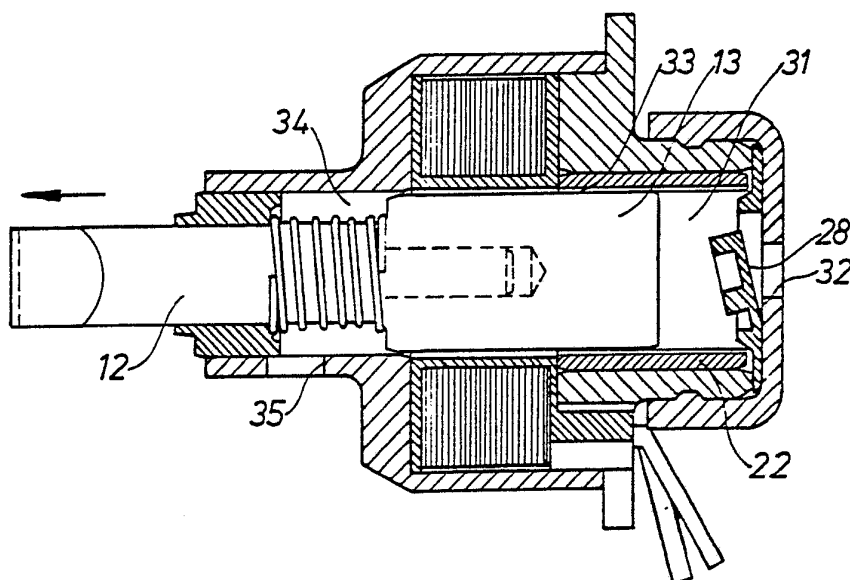
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(54) Title: PRINT HAMMER FOR PRINTERS AND TYPEWRITERS

(57) Abstract

A print hammer for printers and typewriters comprises a hammer rod (11) which is axially movable in a housing (17, 18). The hammer rod is biased towards a rest position by a spring and can be moved to a print position by a drive means, for example a solenoid coil (19). The hammer rod delimits a room (31) in the housing the size of which increases during the movement of the hammer rod towards the print position. The room (31) is connected to the surrounding atmosphere via a narrow channel (33) and also via a valve means (25, 28) which is open during the movement to the print position but closed during the return movement to the rest position. The valve means (25, 28) also forms a stop member for the hammer rod (11) in the rest position.



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Print hammer for printers and typewriters

The present invention refers to a print hammer for printers and typewriters of the kind appearing from the preamble of the appending claim 1.

A print hammer of the kind referred to is used for example in a typewriter to strike a type character to move it into contact with a recording medium in order to reproduce the character on said medium. The type character may be selected, for instance, from a number of characters disposed along the periphery of a type disc.

The print hammer comprises a hammer rod which is movable backwards and forwards in a housing. Biassing means operate the hammer rod to a rest position and drive means operate the hammer rod to a print position. When returning to the rest position the hammer rod normally hits a stop member and the remaining kinetic energy causes the hammer to bounce and to start moving again towards the print position. In order to prevent such bouncing the return movement of the hammer rod must be dampened to such extent that almost no kinetic energy remains when the hammer rod hits the stop member.

The object of the invention is to provide a print hammer of the kind referred to which has been provided with a damping device which dampens the return movement of the hammer rod in a simple and reliable way. The object is achieved with a print hammer having the features stated in the appending claims.

The invention will now be described in detail with reference to the accompanying drawings in which Figs. 1-3 show a print hammer according to the invention in section and with the hammer rod in different positions. In Fig. 1 the hammer rod is in its rest position. In Fig. 2 the hammer is moving towards the print position and in Fig. 3 the hammer rod is shown in a position during the return movement towards the rest position.

In the embodiment an electromagnetically driven hammer will be described which generally is referred to by the numeral 10. A hammer rod 11 comprises a front part 12 of non-magnetic material and a rear part 13 connected to the front part and made from magnetic material. The front part 12 has an impact surface 14 being intended to cooperate with a selected one of a number of type characters disposed along the periphery of a type disc, also called daisy wheel. Such a type disc is commonly known and is not shown in the drawing. Moreover, the front part 12 is journaled in a slide bearing 15 which has been pressed into a

hole 16 in a front housing part 17 which with a rear housing part 18 forms a hammer housing. The part 18 is pressed into the part 17 securing between them a coil 19 which can be electrically connected via two terminals 20,21. A slide bearing 22 pressed into the housing part 18 forms a bearing for the rear part 13 of the hammer rod 11. The rear part 13 has greater diameter than the front part 12 of the hammer rod 11 and has a shoulder 23. Between the shoulder 23 and the slide bearing 15 is provided a helical spring 24 which biases the hammer rod 11 towards its rest position, as shown in Fig. 1.

A valve device comprises a disc 25 which is jammed against the housing part 18 by a cover 26 being fixed to the said housing part by a snap fastening arrangement 27 consisting of a ring-shaped bulge in the cover and a correspondingly shaped groove in the housing part 18. A central valve disc 28 is cut out in the disc 25 of the valve device, said disc being circular in shape and being connected to the disc 25 by a narrow strip 29. An annular projection 30 being part of the valve disc 28 forms a stop member against which bears the part 13 when in rest position. The valve disc 28 with the annular projection 30 is made of elastic material, preferably a plastics material. Thereby, the valve disc by compressing of the annular projection 30 can take up the kinetic energy that may remain stored in the hammer rod 11 when reaching the rest position.

During the movement of the hammer rod towards the print position a room 31 is formed the size of which changes during the said movement to be at a maximum when the hammer rod reaches the print position. Through a hole 32 provided in the cover 26 air may be introduced into the room 31. A narrow annular channel 33 provided between the slide bearing 22 and the rear part 13 of the hammer rod interconnects the room 31 with a room 34 delimited by the hole 16 and the front part 12 of the hammer rod. The room 34 is connected to the surrounding atmosphere by an opening 35.

The above print hammer and the dampening device function in the following way.

In Fig. 1 the hammer rod 11 has taken its rest position in which the part 13 by the spring 24 is operated to bear on the annular projection 30, at the same time operating the valve disc 28 to close the hole 32.

Fig. 2 illustrates the course following the activation of the coil 19. The hammer rod 11 is driven to the left towards the print position against the action of the spring 24. Upon the movement of the hammer rod a vacuum will be created behind the rear part 13 of the rod and this vacuum operates the valve disc 28 to open the hole 32 to let air flow into the room 31 to fill it. The degree of filling is at its maximum when the hammer rod has reached its print position.



As shown in Fig. 3, after the hammer has hit the type character, the return movement starts and the hammer rod is now driven by the kinetic energy that remains after printing and by the action of the spring 24. The air volume trapped in the room 31 will be compressed creating an overpressure that operates the
5 valve disc 28 to close the hole 32. During the continued return movement the air volume will be more and more compressed and because air is permitted to leave the room 31 only through the narrow channel 33 the movement will be damped and when the hammer rod reaches the rest position most of the kinetic energy has been exhausted. The small rest energy that may still remain when the rod has
10 reached the rest position is taken up by the valve disc 28 by compressing of the annular projection 30.

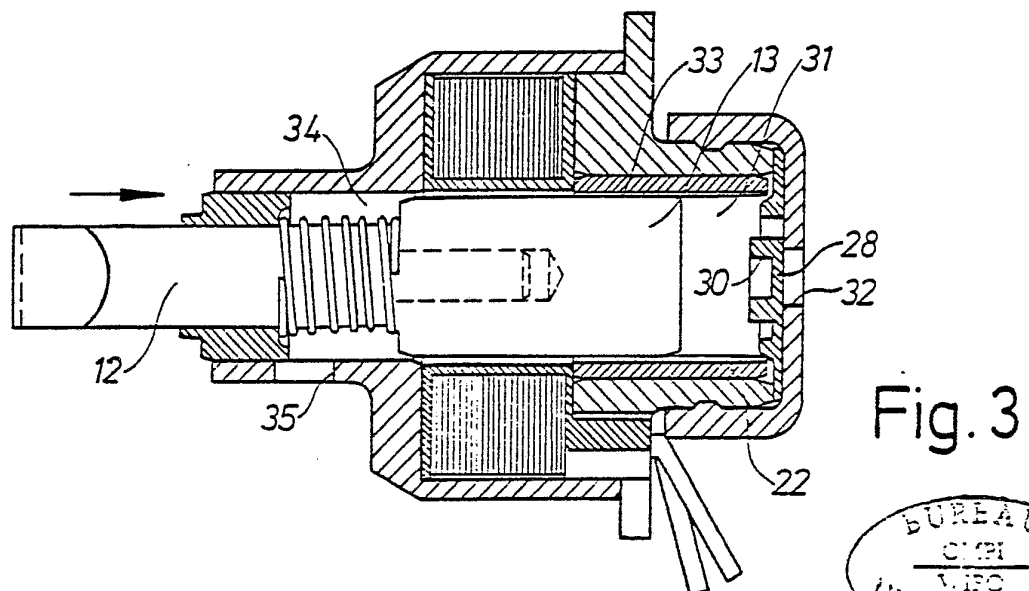
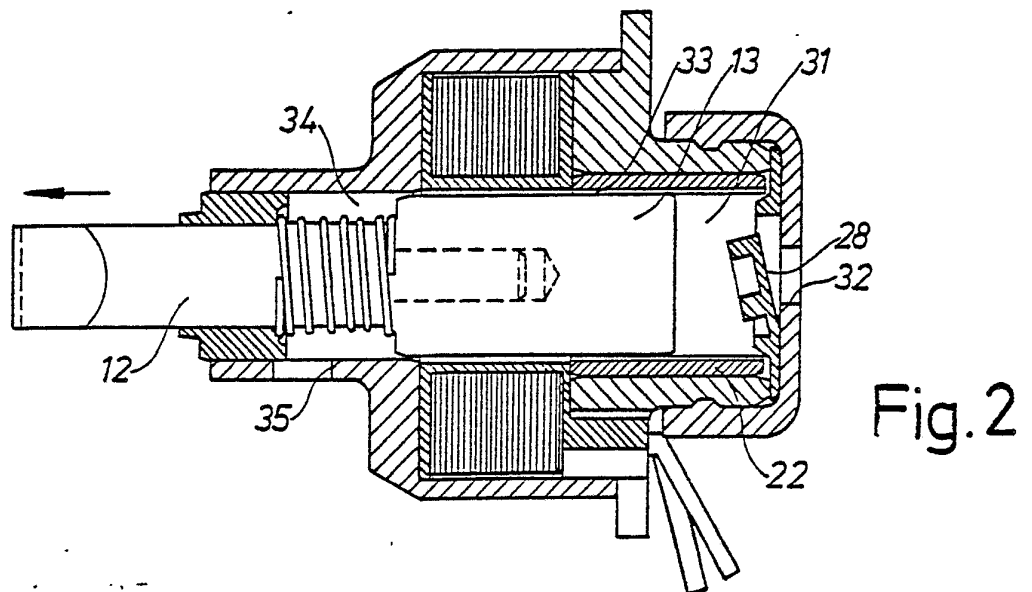
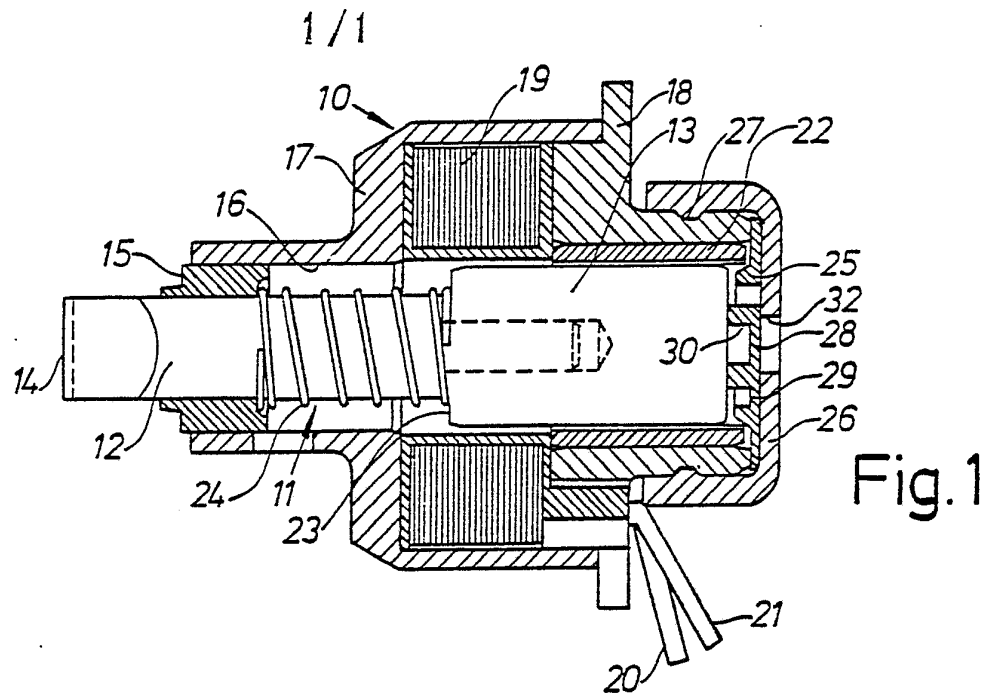
The embodiment described above and shown in the drawing is not intended restrict the invention in any way, the scope of which will be determined only by the appending claims. For instance, the electromagnetic drive means described
15 may be replaced by a drive means of a different kind without deviating from the inventive idea.

Claims

1. Print hammer for printers and typewriters, comprising a housing (17,18) and a hammer rod (11) axially movable in the housing, the hammer rod being operated to a rest position by biasing means (24) and to a print position by drive means (19), a dampening device (13,22,25,28) being provided in the housing to cooperate
5 with the hammer rod (11) to dampen the return movement from the print position to the rest position, the dampening device comprising a piston (13) which is movable in a recess (16), the piston delimiting a closed room (31), the size of which changes in dependence on the position of the piston, the room (31) being connected to the surrounding atmosphere via a narrow annular channel (33)
10 provided between the piston (13) and the walls of the recess (16) surrounding the piston, characterized in that the piston (13) is constituted by the rear part of the hammer rod, the rear part completely filling the closed room (31) when the hammer rod is in its rest position, a valve means (25,28) being provided, said valve means being operated by the air pressure in the closed room (31) during
15 the movement of the hammer rod towards the print position to open a connection (32) between the closed room (31) and the surrounding atmosphere of a size such as to have the movement uninfluenced and during the return movement to close the said connection.
2. Print hammer according to Claim 1, characterized in that the
20 closed room (31) is essentially delimited by a slide bearing (22) enclosing the hammer rod (11), the rear end surface of the hammer rod and the valve means (25,28), the narrow channel (33) being constituted by the space between the hammer rod (11) and the slide bearing (22).
3. Print hammer according to Claim 1 or Claim 2, characterized in
25 that the hammer rod (11) comprises a rear part (13) and a front part (12) of reduced diameter, a room (34) being provided between the front part (12) and the wall of the recess (16), the said room (34) connecting the narrow channel (33) to the surrounding atmosphere.
4. Print hammer according to Claim 2 or Claim 3, characterized in
30 that the valve means (25,28) comprises a movable valve disc (28) which is arranged to close a hole (32) in the housing and to form a stop member (30) for cooperation with the hammer rod in its rest position.
5. Print hammer according to Claim 4, characterized in that the
35 valve disc (28) as well as the hole (32) have circular shape, the valve disc at its side remote from the hole being provided with an annular projection (30) against which the hammer rod (11) bears in the rest position.

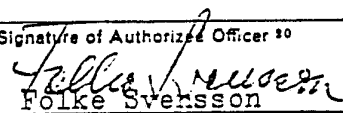
6. Print hammer according to Claim 5, characterized in that the valve disc (28) is made of elastic material, preferably a plastics material.

7. Print hammer according to Claim 5 or Claim 6, characterized in that the valve means (25,28) comprises a circular disc (25) at its periphery being
5 secured to the housing (17,18) by a cover (26) which contains the hole (32) closable by the valve disc (28), the valve disc (28) being formed by a central part cut from the circular disc (25) and connected at one point along its periphery to the circular disc by a narrow strip (29).



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE82/00013

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 3		
B 41 J 9/42		
II. FIELDS SEARCHED		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
IPC 3	B 41 J 1/24-/30, 9/00-/06, 9/127, 9/133, 9/38, 9/42, G 06 K 15/02 .../...	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT 14		
Category *	Citation of Document, 15 with Indication, where appropriate, of the relevant passages 17	Relevant to Claim No. 18
A	DE, A1, 2 839 024 (EXXON RESEARCH AND ENGI- NEERING Co) 22 March 1979	
A	DE, A1, 2 261 410 (OLYMPIA WERKE AG) 4 July 1974	
A	DE, B2, 2 119 415 (NIXDORF COMPUTER AG) 25 September 1975	
A	US, A, 4 239 401 (PLESSEY PERIPHERAL SYSTEMS) 16 December 1980	
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search *	Date of Mailing of this International Search Report *	
1982-04-27	1982-05-07	
International Searching Authority *	Signature of Authorized Officer 20	
Swedish Patent Office	 Folke Svensson	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields Searched (cont)

National C1 15g:42

US C1 101:93.02, 93.28-93.48;
 197:53-54, 183;
 400:139-144.4, 157.1-157.2,
 167, 686-687;
 335:257

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the International application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹

This International Searching Authority found multiple inventions in this International application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International search report covers all searchable claims of the International application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this International search report covers only those claims of the International application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
☐ No protest accompanied the payment of additional search fees.